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Reply to Office Action of Jan. 14, 2004

### REMARKS

Claims 1-31 were presented for examination. Claims 1-12, 14-16, 18, 19, 21-25, 27, 28, 30 and 31 were indicated as rejected, claims 13, 17, 20, and 29 were indicated as objected to and claim 26 was not treated in the Office Action Summary. The Detailed Action portion of the Office Action, however, indicates that claim 29 is rejected and claim 26 is objected to. It will be assumed that the Summary is in error in these regards. By the present communication, claim 1 is amended.

### Rejections Under 35 U.S.C. § 102(b)

Claim 1, 14, 16, 28, 29 and 31 were rejected under 35 U.S.C. § 102(b) as being anticipated by Gudat et al. Applicant respectfully traverses this rejection.

Claim 1, as amended, recites, in part, a system for determining the position of a working part of a tool on a machine. The system has an apparatus on the machine to determine the position and orientation of the machine according to a fixed coordinate system. The system also includes another device on the working part of the machine to determine the position of the working part relative to the position of the machine. A third device located on the machine itself is used to calculate the position and orientation of the working part of the machine based on the position and orientation of the machine in the fixed coordinate system as well as the positional relationship between the working part and the machine as a whole.

Gudat discloses a system for real-time monitoring and coordination of multiple geography-altering machines on a single work site (Page 8, lines 20-22). However, Gudat is concerned with the coordination of machines relative to each other (Page 8, lines 32-34) and is not concerned about the position of the working part of the machines in relation to the machine itself. Gudat discloses placing a positioning device of the working part to determine where that working part is relative to the other working parts on a work site (Page 28, lines 24-30) or where the tracks of the machines are relative to

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the other tracks (Page 28, lines 30-35) or whether the working part is in contact with the ground (Page 29, lines 10-13). Gudat does not disclose calculating the position and orientation of the working part relative to the machine itself in order to determine the position and orientation of the working part in the fixed coordinate system. Gudat determines only the simple rudimentary position of the working part (Page 28, lines 24-30) relative to the other working parts located in the coordinate system. In the claimed invention, orientation is defined to include both inclination and orientation. In contrast, Gudat defines orientation as the position of the machine on a two-dimensional site map as well as its elevation on the topography map (Page 7, lines 8-15). Gudat does not use inclination as a factor in determining orientation.

Further, Gudat calculates the position of the machines from a remote base reference station (Page 7, lines 29-30) in contrast to the claimed invention which determines the accurate position as well as orientation of the working part in a fixed coordination system by using a calculating device resident on the machine itself. Using a remote location to calculate machine position introduces time delay that needs to be corrected by extrapolation using Bresenham's algorithm (Page 29, lines 14-33) resulting in an approximation as to where the machine is positioned at any given time. Using Bresenham's algorithm means in Gudat the system is assuming the machine is moving in a continuous path (Page 29, lines 23-26). Bresenham's algorithm will not make accurate predictions if the machine changes course from its predicted continuous path and starts moving, for example, backwards or sideways. Therefore, in Gudat, if the machine changes course, its position will not be displayed accurately to the other machines during the resulting time delay. In the claimed invention, because the calculating device is resident on the machine, the position of the working part can be determined almost instantaneously. Because Gudat does not teach or suggest all of the limitations presented in the claimed invention, Applicant asserts that claim 1 is not anticipated by Gudat, and requests that the Examiner withdraw her rejection of claim 11.

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Independent claim 14 also recites determining the position and orientation of the working part of the machines in relation to the machine itself as was called for in claim 1. Therefore, for the same reasons discussed above, Applicant believes claim 14 is also not anticipated by Gudat, and requests that the Examiner withdraw her rejection of claim 14.

Claims 16, 28, 29 and 31 depend on independent claims 1 and 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art.

For example, claim 16 recites measuring the position by at least two detectors arranged to cooperate with a stationary measuring station to give the orientation in space of a designated place on the machine. These limitations are not taught nor suggested by Gudat. Gudat discloses using a single detector to determine position but not orientation of the designated spot on the machine.

In addition, claim 29 recites an optical unit aligned towards the stationary measuring station by using a chosen beam selected from the group consisting of the measuring beam of the stationary measuring station, a beam parallel with the measuring beam of the stationary measuring station, and a beam transmitted from the optical unit and reflected in a prism in the stationary measuring station. This limitation is not taught or suggested by Gudat. Further, claim 29 depends from claim 5 which was not rejected under 35 U.S.C. § 102(b). If a base claim is not anticipated by the prior art, then a claim dependent on that base claim cannot be anticipated. Applicant, therefore, believes claims 16, 28, 29 and 31 are also not anticipated by Gudat, and requests that the Examiner withdraw her rejection of claims 16, 28, 29 and 31.

Rejections Under 35 U.S.C. § 103(a)

Claims 3, 6 and 19 were rejected under 35 U.S.C. § 103(a) as being

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unpatentable over Gudat in view of Diekhans. Applicant respectfully traverses this rejection.

The Examiner admits Gudat fails to teach the position-determining apparatus that comprises a stationary measuring station placed in the vicinity of the machine and is configured to determine the position of the machine in cooperation with detector equipment where the detector equipment comprises at least two detector units placed at designated spot on the machine at fixed positions and arranged to cooperate with the stationary measuring station to give the orientation in space for the designated place on the machine. The Examiner cites Diekhans as filling in the missing teaching. Diekhans discloses an agricultural vehicle equipped with a GPS navigation receiving unit with a device that is adjustable relative to the position and orientation of the vehicle (Col. 1, lines 8-11). No motivation exists to combine Gudat with Diekhans "in order to optimize the operation of the vehicle." There is no suggestion of optimization in either reference, nor is there any other reason evident in the references which would lead to a combination. Rather, this is simply an impermissible hindsight combination of Gudat and Diekhas

In addition, claims 3, 6 and 19 depend from the independent claims 1 and 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art. Applicant believes that claims 3, 6 and 19 are patentable over the prior art and requests the Examiner withdraw her rejection of claims 3, 6 and 19.

Claims 2, 4, 7, 15, 27 and 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Ford. Applicant respectfully traverses this rejection.

The Examiner admits Gudat fails to teach the north-seeking/target unit and cites Ford. Ford discloses a navigational systems for ships and aircraft which determines pitch, azimuth, and position (Col. 1, lines 13-16). Additionally, Ford discloses north-seeking gyroscopes in determining pitch and heading of a ship or aircraft as prior art in

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the background section (Col. 1, lines 19-21). However, claims 4 and 7 do not recite a north-seeking target unit as disclosed in the background section cited by the Examiner in Ford. Consequently, the limitations of claims 4 and 7 are not suggested or taught by Gudat or Ford or by the hypothetical combination of Gudat and Ford. Nor is there any motivation to combine Gudat and Ford. It would not be obvious to combine a navigational system of a ship or an aircraft with a heavy land-based machinery in order "to enhance the system." Ships and aircraft tend to move at much quicker speeds and over greater distances than slow and heavy, land-based machinery. Further, such heavy, land-based machinery generally do not require navigational systems as sophisticated as those for ships and aircraft. The combination of the references is not suggested anywhere in their disclosures.

In addition, claims 2, 4, 7, 15, 27 and 30 depend on independent claims 1 and 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art as was discussed above. Applicant believes that claims 2, 4, 7, 15, 27 and 30 are patentable over the prior art and requests the Examiner withdraw her rejection of claims 2, 4, 7, 15, 27 and 30.

Claims 5, 8, 18 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Johnson. Applicant respectfully traverses this rejection.

The Examiner admits Gudat fails to teach "the optical unit aligning itself towards the stationary measuring station with help" and cites Johnson. Johnson discloses a passive stationary infrared optical communications system to be used at high speeds between two computer systems preferably in the airline industry (Col. 3, lines 28-33). Claim 5 calls for a rotatably mounted and controllable optical unit on the machine which indicates the orientation of the optical unit in relation to the machine and transmits this orientation to the calculating device for determining the orientation of the machine in the

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fixed coordinate system. Claim 18 calls for the method by which this is accomplished. This limitation is not suggested or taught by Gudat or Johnson nor it is suggested or taught by a hypothetical combination of Gudat and Johnson. Additionally, claims 8 and 20 recite measuring both position and orientation by providing a geodesic instrument with target-seeking function placed at a distance from the machine and measuring against at least one target on the machine. This limitation is also not suggested or taught by Gudat or Johnson, nor by a hypothetical combination of Gudat and Johnson. Further, there is no motivation to combine Gudat and Johnson. It would not be obvious to combine a communication system of a an aircraft with a heavy, land-based machinery in order "to enhance the system" since heavy, land-based machinery typically do not travel at speeds or over the distances that high-speed aircraft do and, therefore, do not require communication systems as sophisticated as those for aircraft. Additionally, the manner in which this enhancement is to be effected is far from clear.

In addition, claims 5, 8, 18 and 20 depend from the independent claims 1 and 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art as was discussed above. Applicant believes that claims 5, 8, 18 and 20 are patentable over the prior art and requests the Examiner withdraw her rejection of claims 5, 8, 18 and 20.

Claims 9 and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Schupfner. Applicant respectfully traverses this rejection.

The Examiner admits Gudat fails to teach "how to calculate the angular position relative to the map" and cites Schupfner as providing this missing disclosure. However, Schupfner fails to remedy the deficiencies of Gudat. Schupfner discloses a method for calibrating an angle sensor in a navigation system that is influenced by the operating temperature of the system (Col. 1, lines 66-67, Col. 2, Lines 1-5). Schupfner does not disclose storing a map and, therefore, it does not disclose relating angular calibrations

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to a stored map. Consequently, the limitations of claims 9 and 22 are not suggested or taught by Gudat or Schupfner or by the hypothetical combination of Gudat and Schupfner. Nor is there any motivation to combine Gudat and Schupfner. It would not be obvious to combine a method for calibrating an angle sensor in a navigation system influenced by the temperature with a heavy, land-based machinery in order "to enhance the system."

In addition, claims 9 and 22 depend from the independent claims 1 and 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art as was discussed above. Applicant believes that claims 9 and 22 are patentable over the prior art and requests the Examiner withdraw her rejection of claims 9 and 22.

Claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Johnson further in view of Ford. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Johnson fails to teach the north-seeking/target unit, and cites Ford as teaching such a unit. It is the Applicant's position, however, that Ford fails to remedy the deficiencies of Gudat in view of Johnson. As discussed above, Johnson discloses a passive stationary infrared optical communications system to be used at high speeds between two computer systems preferably in the airline industry (Col. 3, lines 28-33) and Ford discloses a navigational systems for ships and aircraft which determines pitch, azimuth, and position (Col. 1, lines 13-16). In addition, Ford discloses north-seeking gyroscopes in determining pitch and heading of a ship or aircraft as the prior art in the background section (Col. 1, lines 19-21). However, claim 21 does not recite a north seeking target as disclosed in the background section of Ford cited by the Examiner. Consequently, the limitations of claim 21 are not suggested or taught by Gudat in view of Johnson or Ford or by the

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hypothetical combination of Gudat in view of Johnson and Ford. Nor is there any motivation to combine Gudat in view of Johnson and Ford. It would not be obvious to combine navigational and communication systems of a ship or an aircraft with a heavy land-based machinery in order "to enhance the system" since ships and aircraft tend to move at much quicker speeds and over greater distances than slow and heavy land-based machinery. Applicant believes that claim 21 is patentable over the prior art and requests the Examiner withdraw her rejection of claim 21.

Claims 10 and 23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Ethridge. Applicant respectfully traverses this rejection.

The Examiner admits Gudat fails to teach "an accurate device that measures the actual position of the vehicle at time intervals" and cites Ethridge. No motivation exists to suggest or teach the combination of Gudat in view of Ethridge in order "to enhance the system." Gudat discloses determining the position of land-based heavy machinery whereas Ethridge discloses a wearable computer that provides positional guidance to parachute jumpers jumping in the dark (Col. 1, lines 56-63). Land-based, heavy machinery and computers for parachute jumpers are two very different technical art areas with very different objectives.

Additionally, claims 10 and 23 depend from the independent claims 13 and 26. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art. Applicant believes that claims 10 and 23 are patentable over the prior art and requests the Examiner withdraw her rejection of claims 10 and 23.

Claims 11 and 24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Ethridge further in view of Vanderwerf. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Ethridge fails to teach "how to calculate the vehicle acceleration and how to integrate the acceleration" and cites Vanderwerf.



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No motivation exists to suggest or teach the combination of Gudat in view of Ethridge further in view of Vanderwerf. Vanderwerf discloses a navigational system for mounting on a vehicle, preferably on aircraft, that compensates for gravity deflections (Col. 2, lines 19-24). It would not be obvious to combine a navigational a systems of an aircraft or positional guidance to parachute jumpers jumping in the dark with a system used on heavy, land-based machinery in order "to enhance the system" since these are very different technical areas.

In addition, claims 11 and 24 depend from the independent claims 1 and 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art. Applicant believes that claims 11 and 24 are patentable over the prior art and requests the Examiner withdraw her rejection of claims 11 and 24.

Claims 12 and 25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Ethridge, further in view of Yamada. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Ethridge fails to teach the subject matter of claims 12 and 25, and cites Yamada as teaching it "in the abstract." However, Yamada fails to remedy the deficiencies of Gudat in view of Ethridge. It is not clear whether the Examiner is referring to the "Abstract" portion of the Yamada reference or to an abstract teaching. If the latter is the case, there is no explanation of the combination, nor why it would be made "to enhance the system."

Claims 12 both disclose, in part, a system comprising a fast determining device with at least one rotation-indicating device for rotation around at least one axis of the machine.

Yamada discloses a navigation unit where the gyro sensor automatically aligns itself in the vertical direction regardless of how the system is mounted (Col. 1, lines 50-54). However, Yamada fails to disclose a relatively fast gyro sensor with at least one

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rotation-indicating device - either abstractly or concretely. Therefore, not one of the references discloses the limitations in the claim 12.

Nor does the hypothetical combination of Gudat in view of Ethridge and Yamada suggest or teach a relatively fast gyro sensor with at least one rotation-indicating device. Therefore, the hypothetical combination of Gudat in view of Ethridge and Yamada does not suggest or teach all the limitations of the claimed invention. Nor is there any motivation to combine Gudat in view of Ethridge further in view of Yamada. Applicant believes that claims 12 and 25 are patentable over the prior art and requests the Examiner withdraw her rejection of claims 12 and 25.

In addition, claims 12 and 25 depend from the independent claims 1 and 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art as was discussed above. Applicant believes that claims 12 and 25 are patentable over the prior art and request the Examiner withdraw her rejection to claims 12 and 25.

#### Allowable Subject Matter

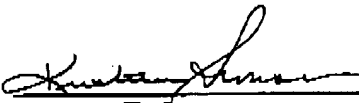
Claims 13, 17, 20, 26 and 29 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (although claim 29 may also have been rejected). Applicant respectfully thanks the Examiner for the indication of allowable subject matter. However, because Applicant believes that claims 1 and 14 from which claims 13, 17, 20, 26 and 29 depend are allowable, based on the amendments and remarks discussed above, claims 13, 17, 20, 26 and 29 have not been rewritten into independent form.

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Conclusion

For the above reasons, the Applicant respectfully submits that the above claims represent allowable subject matter. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,  
DINSMORE & SHOHL LLP

By   
Kristina E. Swanson  
Registration No. 53,657

One Dayton Centre  
One South Main Street, Suite 500  
Dayton, Ohio 45402-2023  
Telephone: (937) 223-2050  
Facsimile: (937) 223-0724

KES/